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INSECTS AND PATHOGENS AFFECTING TREE MORTALITY IN THE ROSE CREEK TIMBER SALE AREA, MI-WOK RANGER DISTRICT, STANISLAUS NATIONAL FOREST

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BACKGROUND

Portions of the Rose Creek Timber Salvage area (T3N, R15E, Sec. 21, 22, 27, 28), Mi-Wok Ranger District were visited on April 29, 1996. This visit was related to the Rose Creek Timber Investigation, Case No. 4250584. Personnel present were Robert Hernandez and Tom Atkin, Law Enforcement - Stanislaus NF; Keith Schnare, Logging Engineer - Region 4; and myself. One objective of the evaluation was to examine the area and stumps for indicators of pests that may have contributed to tree mortality in 1993. There is some contention that green trees may have been removed in what was designated as strictly a salvage sale. Also, photographs taken in March, 1994, of stumps and logs in question were examined.

The sequence of events related to the salvage sale was as follows:

1. **August, 1993** - Logging was completed on the original Rose Creek Salvage Sale. At this point, all dead and dying trees that met the Stanislaus National Forest Six Month Salvage Marking Guidelines had been removed from site. The largest and oldest snags on the site were left as wildlife trees at a average of 1.5 snags per acre.

2. **November, 1993** - A controlled burn was run through the area. This fire burned hot in some locations, becoming a crown fire that killed the foliage on some residual live trees.

3. **February/March - 1994** - Area was entered again to remove trees damaged by the controlled burn and others that were considered hazardous to helicopter operations.

SITE/STAND CONDITIONS

The Sale Area is a low elevation site between 2200 and 3200 feet on the western slope of the Sierra Nevada. Tree cover is predominately ponderosa and sugar pines with smaller amounts of incense cedar, California black oak, and live oak. As the area was traversed, observations were made on insects and pathogens capable of causing tree mortality that were present, and the condition of cut stumps. Evidence of three primary forest pests was found on trees remaining on or adjacent to the site. Light infections of western dwarf mistletoe (Arceuthobium campylopodum) were present in one small portion of the sale area. Two standing, recently killed ponderosa pine trees had bark beetle pitch tubes (assumed to be from western pine beetle, Dendroctonus brevicomis) on the mid to lower bole. Several ponderosa pine and sugar pine stumps had pitch tubes of the red turpentine beetle (D. valens). Mountain pine beetle (D. ponderosae), the primary bark beetle affecting sugar pine, was not found because currently dying or recently killed sugar pine were absent from the areas we visited. The mountain pine beetle is capable of attacking ponderosa pine in California but is usually out-competed by the western pine beetle. Also absent was any top-killing of pines normally caused by species of Ips (pine engraver beetles). No evidence of root disease pathogens were found.

DISCUSSION AND CONCLUSIONS

In the mixed conifer forests of the Sierra Nevada, most pine mortality is associated with attacks of one or more species of aggressive bark and/or engraver beetles. Conifers weakened by agents such as drought, root disease, dwarf mistletoe, and fire are very susceptible to attacks by bark beetles. The Rose Creek sale was a result of several years of below normal precipitation and insect activity.

If bark beetles successfully attack trees, they feed in the cambium/phloem area under the bark and often introduce blue stain fungi which begins the process of tree deterioration and death. When a tree dies, the usual sequence of events is for the green foliage to turn a light green to straw color then orange red, and finally brown. Foliar discoloration often begins in the top of a tree, but then the entire crown fades uniformly. After needles turn brown, they begin to fall from the tree. Later, the tree begins to lose small dead twigs. This process normally takes at least one or two years. As deterioration progresses over the next few years, decay fungi continue to break down the sapwood, tree tops and small branches may begin to break out, and the bark may loosen.

Intense crown fires can rapidly kill some or all of the green foliage, immediately turning the needles brown. At this time, however, it is difficult to determine if the tree crown has been completely killed, or if dormant buds will flush out the following spring. If buds survive the fire, the tree may recover from fire injury.

Photographs taken in March, 1994, shortly after tree felling, show that most stumps had considerable resin (pitch) soaked sapwood which indicates that at least the lower bole and roots of these trees were green when cut. Resin soaked wood is very resistant to decay fungi and deterioration. Photographs also showed that branches removed from some felled trees had green foliage which indicates the upper bole was alive when cut.

Evidence seen in the photographs, observations made during the site examination, and the timing or sequence of events all indicate that there was not enough time (approximately 4 months) between the controlled burn (November, 1993) and tree felling (February/March, 1994) for large, living conifers, damaged by fire or other agents, to deteriorate to a hazardous condition. Insect pests such as the western pine beetle and mountain pine beetle are generally inactive in this area during the winter months. Even if the controlled burn in November, 1993, killed or weakened pines, they would not have been subject to insect attack until the spring or early summer of 1994.

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